U. S. DEPARTMENT OF AGRICULTURE

FARMERS' BULLETIN No. 920 rev. June 1926

Rev. ed. follows

MILK GOATS

THE PRODUCTION of milk goats has for a great many years been an important feature of the livestock industry in many European countries, but it has never had a very strong foothold in the United States. In this country the goat has always been an animal of more or less ridicule, as the majority of the people do not realize the possibilities of certain breeds or types that have been bred for many years along definite lines.

In continental Europe milk goats are largely used by families unable to keep a cow, and great benefit is derived from having fresh milk at hand and at a low cost. In those countries the goat is often spoken of as the "poor man's cow."

During the past several years considerable interest has been manifested in the milk-goat industry in this country. The fact that the goat will supply sufficient milk for the average family and can be kept where it would be impossible to keep a cow is beginning to appeal to many people, especially those living in the small towns and the suburbs of the large cities.

The milk-goat industry is only in its infancy in America. This type of goat is adapted to our country, and the industry should become of greater importance every year.

Washington, D. C.

Issued February, 1918
Revised June, 1926

MILK GOATS

By EDWARD L. SHAW, *formerly Senior Animal Husbandman, Animal Husbandry Division, Bureau of Animal Industry*[1]

CONTENTS

	Page.		Page.
Present status of the industry	1	Feed and management	18
Goats' milk	2	Goat meat and goatskins	28
Goat dairies	5	Prices of goats	29
Breeds and types of goats	7	Goat troubles	29
Methods of breeding	16	Milk-goat registry associations	32

PRESENT STATUS OF THE INDUSTRY

THE MILK-GOAT industry in the United States has not yet developed to any important extent. The interest shown in the past has come largely from people who were either reared in, or at least are familiar with conditions in, countries where the milk goat has been a success. It requires time to educate people to the value of any new industry, especially one that has been so greatly handicapped as has been the case with the milk goat. In Switzerland, Italy, Germany, France, Norway, and Spain milk goats are largely used by families not so situated as to permit keeping a cow. F. S. Peer, a well-known American importer of livestock, after making an investigation of the industry in Switzerland, stated that "the goat of Switzerland is the Swiss peasant's cow and Swiss baby's foster mother, a blessing to the sanitariums for invalids, and a godsend to the poor."

In England and in many other parts of Europe people who leave the cities during the summer months either for their country homes or for travel often take a milk goat with them so that the infant or other members of the family may have a good supply of milk of uniform quality. Similar instances have been recorded in this country. No other animal is so well adapted for such a purpose, and there is probably no other country where goats are so much needed for such a purpose as in the United States.

The industry in the past has been greatly handicapped owing to the scarcity of good goats for foundation herds. Only a few goats have been imported, as will be noted later in discussing the different breeds. Importations can not be made at the present time from most of the countries where desirable goats are produced. But the goats that have been imported have been rather widely distributed and most of them seem to have done well under their new environment.

[1] Mr. Shaw left the department June 30, 1921. This edition was revised by C. G. Potts, Associate Animal Husbandman.

The milk goat is adapted to this country and the industry is likely to become of greater importance every year. The goat is especially useful to those who desire a small quantity of milk and do not have the room, or can not afford, to keep a cow. In fact, a goat can be kept where it would be impossible to keep a cow, and it will consume considerable feed that otherwise would be wasted. The fact that goats are rarely affected with tuberculosis is another point in their favor. The demand for good goats appears to be far greater than the supply.

GOATS' MILK

YIELD

About the first question that most people ask concerning milk goats is, "How much milk will one produce?" This is, of course, a very important consideration, as the value of a doe is estimated largely by her milk production. Even if a doe is purebred, she is of little value from the utility standpoint unless she is capable of giving a good quantity of milk. Many persons in purchasing grade or even purebred goats have been disappointed to find that the milk could be measured in pints and not quarts or gallons, as expected.

A doe that produces 3 pints a day is considered only a fair milker, while the production of 2 quarts is good, and the production of 3 quarts is considered excellent, provided the lactation is maintained for from 7 to 10 months. There is probably no better way to treat this matter than to state that good does should produce from 8 to 15 times their weight in milk in a lactation period. It is stated by German writers that many goats yield ten times their body weight of milk annually, and exceptional animals as much as eighteen times their weight. The production of some of the goats in this country will be noted in the section dealing with the different breeds and types.

PRICES

The price to be obtained for goats' milk depends on a number of conditions. If the milk is to be sold for ordinary uses the price, of course, will be much lower than if a special market has been developed. In the past the price has ranged from 10 to 50 cents a quart, and the highest prices have been obtained when the milk has been supplied for the use of infants and invalids. The demand and the cost of production will serve as a guide as to what price should be obtained. Just so long as good goats are scarce and high-priced it will be necessary to get good prices for the products, whether in the form of milk or cheese, to encourage people to engage in the industry.

It is of interest to note that there is on the market a brand of evaporated unsweetened goats' milk that retails for 20 cents a can of 11 ounces, which is equivalent to about 30 cents a quart for the original milk.

CHARACTERISTICS

Goats' milk is nearly always pure white in color. The small size of the fat globules is one of its chief characteristics. The cream rises very slowly and never so thoroughly as in the case of cows' milk. This condition makes impracticable the ordinary method of

obtaining cream by allowing it to rise. It has been stated that goats' milk will not keep sweet so long as cows' milk, but tests have shown that this is not the case. The keeping quality of any milk depends on the conditions under which it has been produced and handled.

In tests made by the Department of Agriculture it was found that goats' milk could be thoroughly separated in a separator, for when milk testing 4.4 per cent fat was run through the separator the skim milk showed only 0.03 per cent of fat.

If goats' milk is properly produced and handled it should have no disagreeable odor or flavor. The principal sources of bad odor or flavor in the milk are particles of dirt or hair that fall into it when milking, keeping the does in unclean quarters, and milking in a barn or pens near the bucks.

COMPOSITION

At the New York Agricultural Experiment Station, at Geneva, N. Y., with a mixed herd of goats, it was found that the percentage of fat in the milk varied from 3.2 to 4.4, the solids (not fat) ranged from 7.72 to 8.61 per cent, and the total solids ranged between 11.4 and 11.9 per cent.[2] The composition of milk from the Bureau of Animal Industry's herd of the common American type of goats, as determined by tests, averaged as follows: Specific gravity, 1.0338; fat, 5.99 per cent; total solids, 16.96 per cent; solids not fat, 10.97 per cent; sugar, 4.93 per cent; total protein, 4.63 per cent; and water, 83.04 per cent. For comparison the following averages of more than 5,000 analyses of cows' milk at the New York station are given: Fat, 3.9 per cent; total solids, 12.9 per cent; solids not fat, 9.0 per cent; sugar, 5.1 per cent; and water, 87.1 per cent.

At the New York station a chemical study of goats' milk indicated no essential difference between the constitution of its casein and that of cows' milk. Marked differences were observed in the salts of the ash as compared with the ash of both cows' milk and human milk, but the effect of these differences has not been fully studied.

GOATS'-MILK PRODUCTS

Goats' milk can be utilized for the same purposes as cows' milk, although for some it is not nearly so well suited. For general use, such as drinking, cooking, and in tea and coffee, the milk has proved to be very satisfactory. The milk of one of the largest herds in the country is evaporated and sold in that form. Goats' milk is less satisfactory than cows' milk for making butter, but large quantities of goats'-milk cheese are manufactured, especially in Europe. Practically all publications dealing with milk goats attribute considerable importance to the use of the milk for infants and invalids.

BUTTER

Good butter can be made from goats' milk, but ordinarily very little is produced. The cream rises very slowly and only a portion of it reaches the top. By the use of the separator, however, practically all the butterfat can be obtained. Unless artificially colored,

[2] Bulletin 429, New York Agricultural Experiment Station, Geneva, N. Y.

the butter is very white and resembles lard in appearance. If colored, it resembles cows' butter in appearance, although it does not have the same texture. It can be used for the table or for cooking. Tests made by the Bureau of Animal Industry proved that a good quality of butter could be produced when the milk and cream were properly handled and no objectionable features were present. It should be noted, however, that when a good price is obtained for the milk, it does not pay to make butter, as cows' butter can be purchased more cheaply.

CHEESE

Several varieties of cheese, known under various names, are made from goats' milk. In France, goats'-milk cheese is called cheveret, or chevrotin; in Italy, formaggio di copra; and in Germany, Weichkäsen aus Ziegenmilch (soft cheese from goats' milk). Goats'-milk cheese has a characteristic and individual flavor all its own, although the product closely resembles Limburger cheese. It is made either entirely of goats' milk or, better, with from one-fourth to one-third cows' milk; the mixture materially improves the quality of the product. The manufacturing process is simple and requires no special equipment other than a few special forms and a curing room which can be kept at a temperature of 60° F.

The fresh milk is set with commercial liquid rennet for about 45 or 50 minutes at a temperature of from 86° to 90° F. It is perhaps advantageous to add a 1 per cent starter. Rennet is diluted about 20 times in cold water and added at the rate of 1 cubic centimeter (25 drops) to 10 pounds of milk. After a thin film of whey has collected on the firm coagulated milk it is cut by means of a cheese knife into pieces about the size of a walnut. After the curd has remained in the whey for 5 minutes it is gently stirred for an equal length of time, and then placed in forms by means of a cup or a long-handled dipper. These forms are made of 3X tin, and are 4½ inches in diameter by 5 inches high. Each form has 5 rows of holes, the holes being about an inch apart and one-eight of an inch in diameter.

The curd remains in the forms undisturbed until it acquires a consistence that will admit of turning. After from 24 to 36 hours at a temperature of 70° F. salt is applied to the surfaces, and the cheese is left on draining boards for about 24 hours. It is then placed on plain boards and carried to the curing room, which should have a temperature of 60° F. and a high humidity.

A blue mold first appears on the cheese and should be removed by brushing with a moistened cloth. A slimy, reddish growth, which appears to be needful in bringing about the proper ripening changes, then covers the cheese. While the curd is at first sour, it gradually becomes less so, and finally develops a sweet and agreeable flavor. When the acidity has disappeared, the cheese is in suitable condition for wrapping.

The cheese may be wrapped in parchment paper alone or in parchment paper and tin foil; the combination seems to be more desirable, as the tin foil aids in preventing drying, promotes ripening, and gives the package a more attractive appearance. The cheese should then be put into regular Camembert boxes. It should take five or six weeks to ripen, and when ripe should have a fine, white color and an

agreeable flavor. About 4½ pounds of milk are required to make each cheese, which when fully ripe weighs about half a pound.

A fairly satisfactory cheese may be made from goats' milk by a method similar to that outlined in Bulletin 79 of the Storrs (Conn.) Agricultural Experiment Station.

The type of Roquefort cheese made from goats' milk is quite different in both flavor and texture from that made from sheep's milk.

MILK FOR INFANTS AND INVALIDS

A great many cases in which goats' milk has proved especially valuable for infants and invalids are on record. In many of these cases other foods had been tried and did not seem to agree with the patients. The following is taken from Bulletin 429 of the New York Agricultural Experiment Station under the heading "Summary":

> Extensive study of the use of goats' milk in infant feeding by Doctors Sherman and Lohnes, of Buffalo, showed that the curds of goats' milk when returned from the stomach were smaller and more flocculent than those of cows' milk. From the determination of the combined hydrochloric acid in the returned food, the authors conclude that the cows' milk had a greater stimulating effect on the stomach than goats' milk. The absorption of the food and gain in weight in comparing the two milks were indefinite for several reasons. The babies tolerated equally well similar amounts of goats' milk with cows' milk when used with the same diluents. The younger the child the more the evidence pointed toward a greater gain on goats' milk.
>
> Goats' milk was supplied to 18 cases of children that were not thriving on any other food that had been tried. In 17 cases a satisfactory state of nutrition was established through the use of goats' milk, the beneficial results in some instances being very marked. With certain of these children their situation was regarded as serious, and their restoration to a satisfactory nutritional condition was good evidence that goats' milk is often a very desirable resort for infant feeding.

In a project carried on cooperatively by the Sea View Hospital, New York, and the Bureau of Animal Industry, the value of goats' milk for tuberculous patients was investigated. All the cases treated were pulmonary tuberculosis varying from quiescent with slight infiltration to active, far-advanced cases with extensive infiltration and cavitation. Adolescents were preferably chosen, irrespective of sex, and in order to have as many as possible under treatment at the same time, some were accepted as young as 6 years of age. A control was selected for each case whose condition closely resembled the one under treatment.

The results showed that the goats'-milk cases and the controls progressed about the same. Ten of the sick cases under treatment showed a definite improvement, whereas 11 of the controls were improved. The bed cases were not weighed, but the patients able to walk were weighed weekly and showed that the treated and the controls gained about the same weight.

GOAT DAIRIES

During the last few years a number of goat dairies have been in operation in different parts of the country. These dairies have been established both for the purposes of producing milk and the manufacture of cheese. The largest goat dairy in the country, however, is devoted to the manufacture of condensed milk. If only a few goats

are kept it is not necessary to have much equipment, but if a considerable number of does are milked it is best to have the proper equipment for handling the work advantageously. This does not mean, however, that expensive buildings must be provided. Any clean, dry quarters free from drafts may be used.

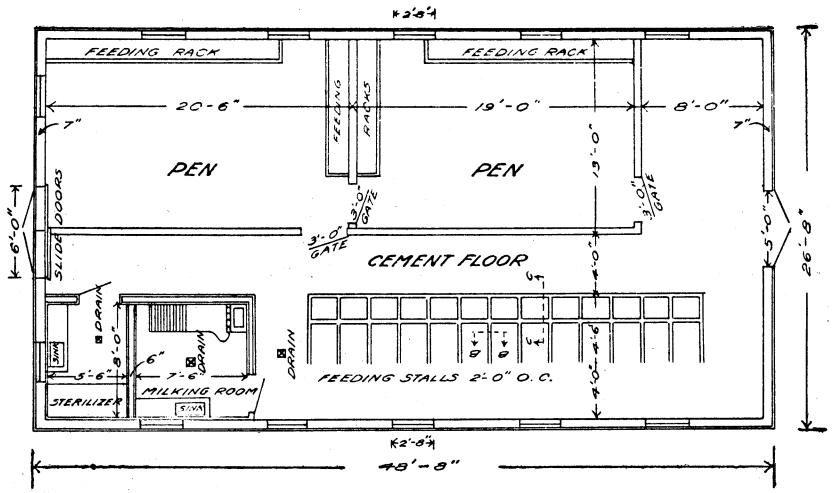

FIG. 1.—Plan of goat dairy at Bureau of Animal Industry Experiment Farm, Beltsville, Md.

The essentials of a dairy are facilities for the proper handling of both the goats and the milk. This means that the building should have proper ventilation, plenty of light, and arrangements made so that each goat can be properly fed and handled. The illustrations given of the goat dairy of the Bureau of Animal Industry, at Beltsville, Md., give a good idea of how to handle a medium-sized herd. (Figs. 1, 2, and 3.) As will be noted in looking this plan over, there

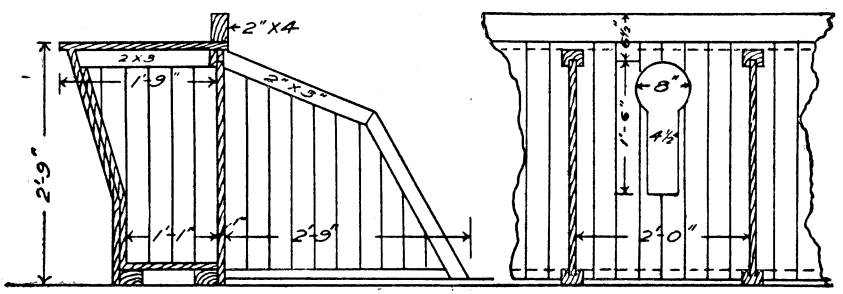

FIG. 2.—*A*, side view of single stall and manger; *B*, division between stall and manger. The opening allows the goat to feed and prevents the waste of feed

are pens in which the does may be handled together and stalls where they can be fed individually. The does wear leather collars and are tied to the mangers in the stalls by means of a short rope with a snap on the end which fastens to the ring in the collar. At kidding time small, temporary pens are easily made by the use of

hurdles and can be utilized as long as necessary. After the does have kidded and the kids are ready to be taken away, the does are transferred to the stalls. Until the kids are at least a month old they are fed and handled in the temporary pens.

The milking room is separated from the main room and has a concrete floor with the walls and ceiling concrete-plastered so that they can be kept clean by washing with the hose. This room is equipped with a sink, milk scales, and milking stand. The milk is handled in another room, called the milk room. This room is equipped with a cooler, a sink, and a sterilizer. The grain is kept in the feed bins at the east end of the main dairy. Hay is stored in a near-by building.

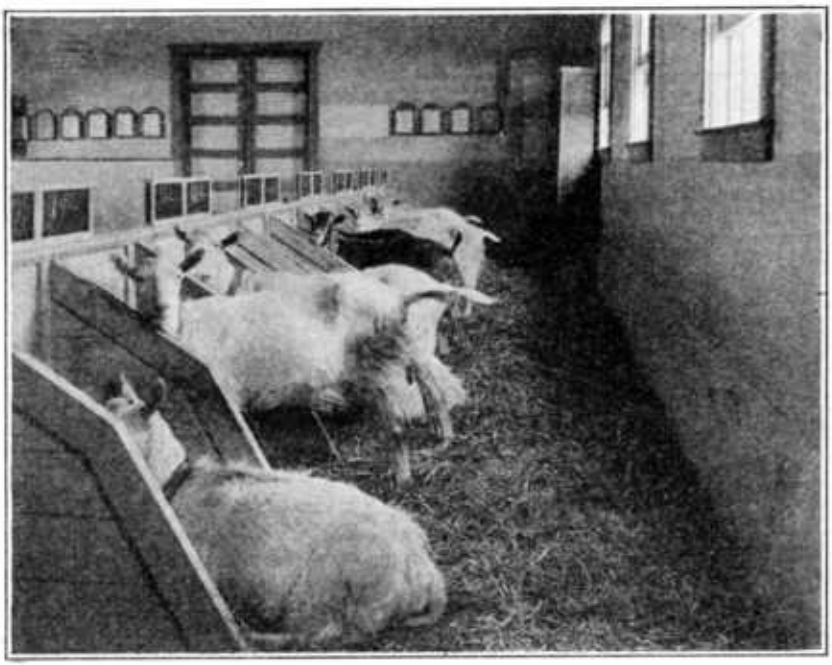

FIG. 3.—Goat dairy of the Bureau of Animal Industry, Beltsville, Md.

BREEDS AND TYPES OF GOATS

Although there are many breeds and types of milk goats in the world, only a few of them have been imported into this country. This is due largely to the fact that there has been a quarantine against most of the countries where the milk-goat industry is one of the important phases of livestock production. It is not known just how many goats of each breed or type have been imported. Many immigrants have brought young goats in baskets with them when entering the country. Then again many goats have been imported and the breed or type was not stated on the records.

The breeds that will be discussed in this publication are the Saanen, Toggenburg, Nubian, Maltese, Schwartzenberg-Guggisberger, and the so-called common or American.

93060°—26——2

SAANEN

The Saanen is one of the leading breeds and takes its name from the Saanen Valley of Switzerland. It is said to be the largest of all the Swiss breeds. Although considered a hornless breed, occasionally an animal is found with horns. The color ranges from a pure to a creamy white. The dairy conformation is especially well developed. The hair is usually short, with the exception of a strip along the spinal column extending to the flanks and the hind quarters. A Saanen buck is shown in Figure 4, and does of this breed are seen on the front page.

The first record of the importation of Saanen was in 1904, when 10 head came in through the Canadian quarantine. These goats were selected in Switzerland by F. S. Peer, and were imported for

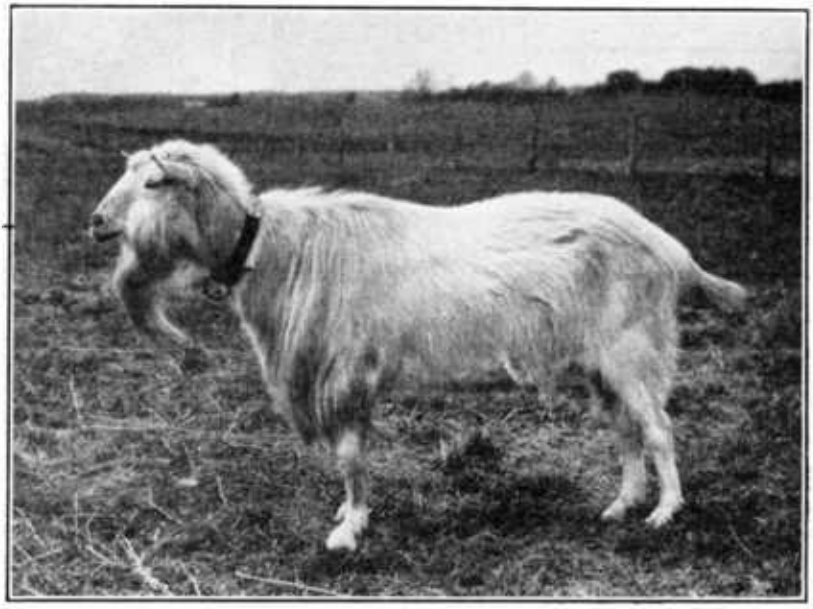

FIG. 4.—Saanen 1191. Purebred Saanen buck used in bureau's herd at Beltsville, 1918 and 1919. Mature weight, 190 pounds

other persons. R. N. Riddle, of New Jersey, imported 20 head in 1905. An importation of 19 head was made in 1906 by Fred Stucker, of Ohio. More recent Saanen importations of note are those by A. B. DeHaan, of Iowa, February, 1920, Mrs. A. L. Bowman, of Vermont, May, 1920, J. C. Darst, of Ohio, August, 1920, and Mr. Dewoyno, of Ohio, January, 1922.

At the Bureau of Animal Industry's Experiment Farm, Beltsville, Md., Saanen bucks have been used for crossing on the common American type of does with excellent results. The Saanen is a very prepotent breed, and in crossing with common does not only is the Saanen color obtained but the size, conformation, and mammary development show great improvement over the common goat.

Crossbred Saanen does have a longer period of lactation than common goats, which is of considerable importance. From records kept

regarding the Government herd, these crossbred and grade does have milked from 7 to 10 months after kidding and produced an average of 3.5 pounds of milk a day. Some of the best averaged about 4 pounds a day for 10 months. The butterfat in the milk has ranged from 4 to 6 per cent, with an average of 5 per cent.

Authentic records kept on high-grade and purebred does show this breed to be one of the highest producers of milk and butterfat. A grade doe in the bureau's herd has produced as high as 12.7 pounds of milk in 24 hours, and an official record of 20 pounds and 11 ounces has been made by a purebred doe in California. Highest producers in the bureau's herd range from 8 to 12 pounds daily during the best period of lactation. A seven-eighths purebred doe produced 1,852.7 pounds of milk in one lactation period of 10 months. A purebred

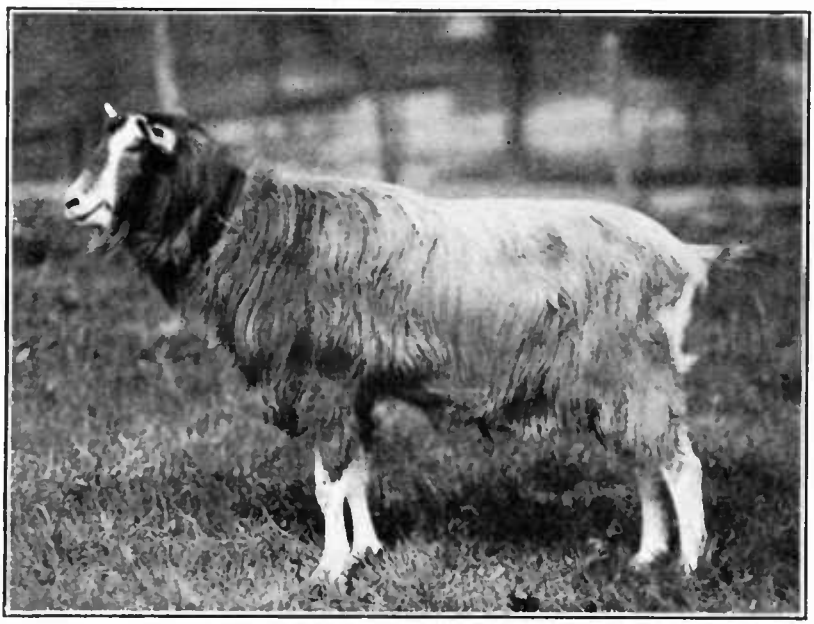

FIG. 5.—Purebred Toggenburg buck Ace's Ne Plus Ultra 16483, used in the bureau's herd at Beltsville, 1923 and 1924. Mature weight, 178 pounds

doe on official test by the University of California produced 4,005.4 pounds of milk in 10 months and 2 days.

In comparing the results of crossing or "grading up" with Saanen and Toggenburg bucks in the bureau's herd, it was found that the Saanen does produced the larger kids and a little greater quantity of milk, whereas the Toggenburg does are more prolific and produce milk which tests a trifle higher in butterfat.

The average weight of mature grade Saanen does in the bureau's herd in 1924 was 122 pounds. This weight was taken about six months after kidding, when the does were in good milking condition.

The Saanen is without question one of the most beautiful and valuable breeds, and as the supply of purebreds is very limited in this country it will be necessary to grade up herds from common stock by using Saanen bucks of the best breeding obtainable.

TOGGENBURG

The Toggenburg is one of the leading breeds of Switzerland and takes its name from the Toggenburg Valley, where they have been bred for a great many years. Although generally considered a hornless breed, occasionally one is found with horns. F. S. Peer, after a trip in the Toggenburg Valley, stated that he did not see a specimen with horns, owing no doubt to the prevailing local custom of weeding out those that developed horns. The color of the Toggenburg is brown with a light stripe or bar down each side of the face. The legs below the knees and hocks are light gray or almost white. The wattles or appendages, two in number, attached to the under side of the neck, are very characteristic of this breed.

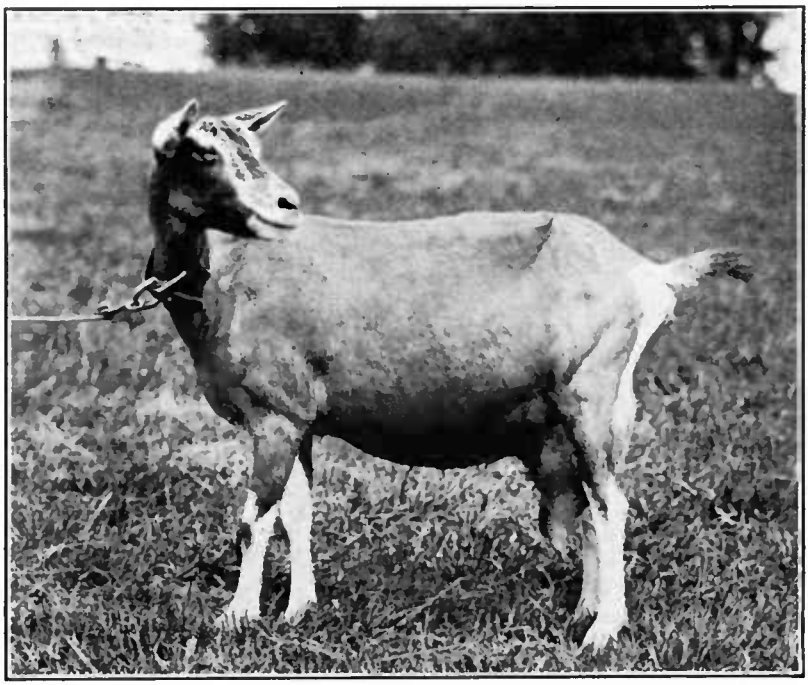

FIG. 6.—Toggenburg doe U. S. D. A. 193. Three-fourths purebred

There are really two types of the Toggenburg, the short-haired and the long-haired. Mr. Peer stated after visiting the Toggenburg Valley in 1904, that he was not able to get a positive answer that one type was any hardier than the other.

The first record of importations of the Toggenburg into the United States was in 1893, when W. A. Shafor, of Hamilton, Ohio, imported 4 head from England. In 1904 F. S. Peer imported from Switzerland for other persons 16 head, which later became widely distributed. One of the largest importations of milk goats ever made to this country was in 1905, when R. N. Riddle, of New Jersey, imported 119 Toggenburgs. These goats were sold over a wide terri-

tory. Another importation of 9 head was made in 1905 by F. S. Peer. In 1906 Fred Stucker imported 13 head.

Other Toggenburg importations of note were those by A. B. DeHaan, of Iowa, February, 1920, Mrs. A. L. Bowman, of Vermont, May, 1920, and J. C. Darst, of Ohio, August, 1920.

The Toggenburg is the most numerous as well as the most popular of the breeds of milk goats in this country. For that reason more has been heard about it and more data are available concerning it. It is said that in Switzerland Toggenburg does produce from 5 to 6 quarts of milk a day, and some of the best even more. Reliable breeders in the United States report does that produce from 4 to 6 quarts a day during the best period of lactation, and a few does have averaged from 4 to 5 quarts for a period of from 8 to 10 months.

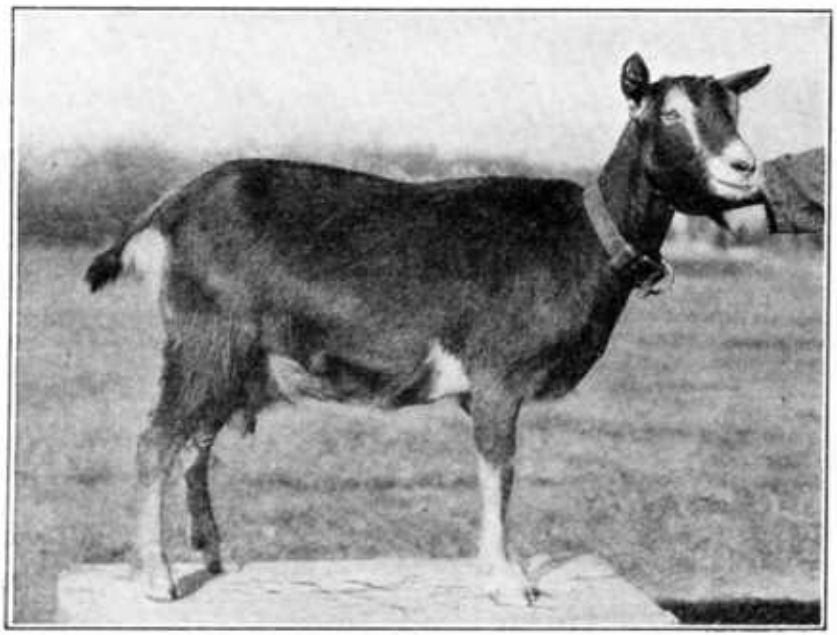

FIG 7.—Half-blood Toggenburg doe No. 114; out of common American doe No. 66. (See fig. 11.) Produced 1,429.3 pounds of milk, testing 5.5 per cent fat, in 365 days

A purebred doe in California is credited with the production of 4,348 pounds of milk in 21 months of continuous milking. Another doe of this breed has a record of 2,941 pounds in one year.

At the United States Experiment Farm, Beltsville, Md., the Bureau of Animal Industry has used Toggenburg bucks in crossing on the common American type of does with excellent results. The Toggenburg is an especially prepotent breed, and the crossbred or grade offspring not only take of the Toggenburg color and markings but show great improvement in conformation and mammary development. Records kept of the bureau's herd show that the crossbred or half-blood Toggenburg does have milked from 6 to 10 months after kidding and produced an average of 3.2 pounds of milk a day.

Some of the best does have averaged 4½ pounds a day. The butterfat has ranged from 4 to 6 per cent; the general average for two years has been 5.2 per cent.

The average weight of the mature grade Toggenburg does in the bureau's herd 1924 was 108 pounds. This weight was taken about three months after kidding, when the does were in good milking condition.

Owing to the fact that Toggenburg goats are more plentiful in this country than other breeds, a good many grade goats of the Toggenburg type are found in various parts of the country. In fact, many herds have been established by crossing Toggenburg bucks on does of the American type.

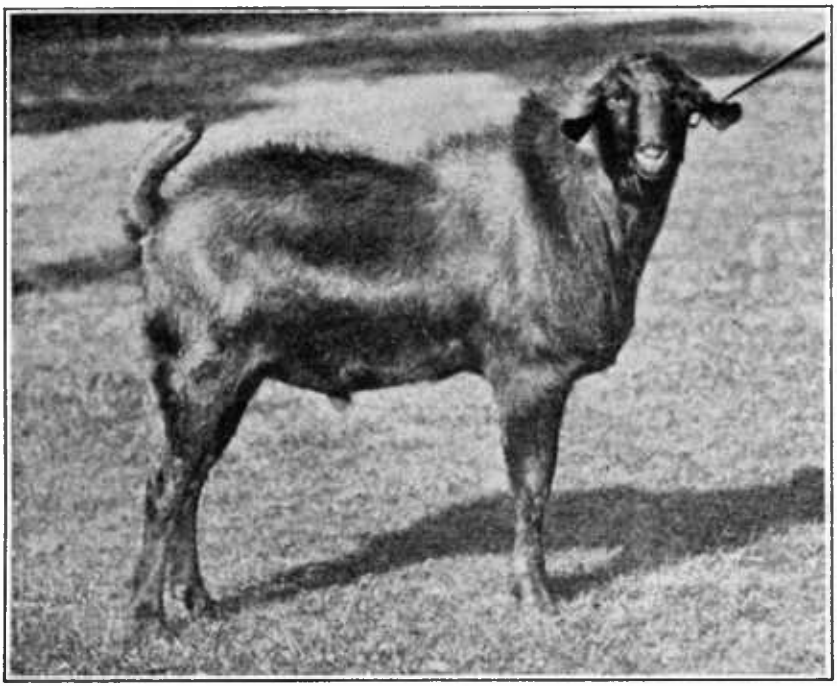

FIG. 8.—Nubian buck

NUBIAN

The Nubian, although considered a valuable breed, is found in but small numbers in this country. It is a native of Nubia, Upper Egypt, and Abyssinia. Its important peculiarities consist in the length of the large drooping ears and the shape of the head. The outline of the face is convex, the forehead being especially prominent, and there is a depression at the nostrils and the lower jaw projects slightly beyond the upper. The ears are wide at places and of such length that they hang below the jaw and turn slightly upward at the ends. The Nubian is considered a hornless breed, but bucks occasionally develop horns. It is one of the largest breeds of goats. The hair is short and fine, and owing to this condition this breed is less hardy than the leading European breeds and can

not stand extreme cold. The color is black, dark brown, or tan, with or without white markings. Purebred Nubian bucks are said to be free, or nearly so, of the odor so prevalent in the males of other breeds.

The Nubian breed is very prolific and one of the best for milk production. Nubian bucks have been crossed on common does with very satisfactory results.

An importation of four Nubians was made to this country from Mexico by W. W. Carr, of Virginia, in 1909. These goats came from France to Mexico.

The Anglo-Nubian, which is a very popular type of goat in England and is found in some sections of the United States, is a cross between the Nubian and the native English goat. These goats are large and valuable for milk production. There is no special fixed color. Black, tan, and red, with or without white, seem to predominate. Occasionally some of the goats are found that are either spotted or piebald. All goats of Nubian breeding have similar characteristics.

In 1896 G. Howard Davison, of New York, imported 4 English goats. It is very probable that they were of the Anglo-Nubian type. In 1909, 4 Anglo-Nubians were imported from England by R. I. Gregg, who also imported 2 from England in 1913. In 1906 D. C. Mayers, of Virginia, imported 7 grade goats from Barbados. Some of these goats were of Nubian breeding.

The Bureau of Animal Industry has never experimented with milking does of Nubian breeding, and so can not give results such as are mentioned for some of the other breeds.

MALTESE

Although considered a valuable breed of milk goat, the Maltese is of no special importance at the present time in this country, except

FIG. 9.—Maltese goats

that it has had some influence on the type of goats in the Southwest. As the name signifies, it is a native of the island of Malta.

This breed is kept in large numbers on that island. It is usually hornless, but occasionally one is found with horns. The ears are rather long and are carried horizontally. The udders are rather large and in many instances almost touch the ground. The hair is rather long, the color being white and reddish brown or black. For milk production this breed is considered one of the best.

For a number of years there has been in the southwestern part of the United States a type of goats known as the Spanish Maltese. It is said that at a former time many Maltese goats were taken into Spain and later found their way to Mexico and finally to Texas

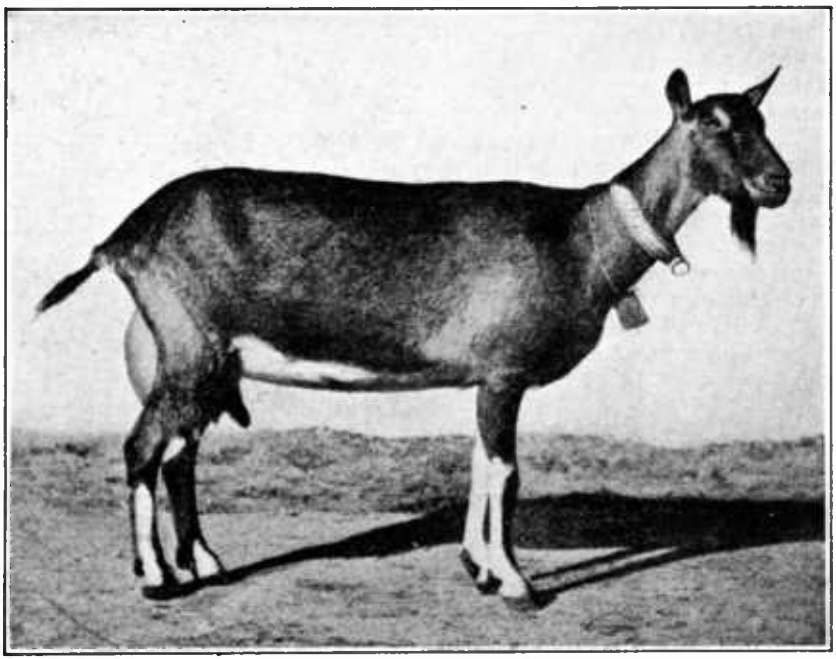

FIG. 10.—Schwartzenberg-Guggisberger doe

and New Mexico. This type of goats is white or grayish in color, but many have brown, bluish-black, or reddish spots. The ears are pendulous. No reliable information is at hand regarding milk production, although it is asserted that some are very good producers.

SCHWARTZENBERG-GUGGISBERGER

The Schwartzenberg-Guggisberger breed came originally from the Simmen Valley, Switzerland. Although it is represented in the United States in only very small numbers, the writer believes that it may prove to be valuable if a sufficient number could be obtained to give it a thorough trial.

This breed is not only of good size but the does show a very good dairy conformation. Hilpert describes it as being built like the

Saanen, of fawn color or brownish white, and of very large size. He also says that it is excelled by no other breed of goats in milk production when under good care and feed. A purebred doe at the New York Experiment Station produced an average of 730.8 pounds of milk a year for three years. The same doe produced 913.3 pounds in one year.

An importation of three head of these goats was made in 1906 by Fred Stucker, of Ohio.

The general conformation and the leading characteristics may be noted from the illustration. (Fig. 10.)

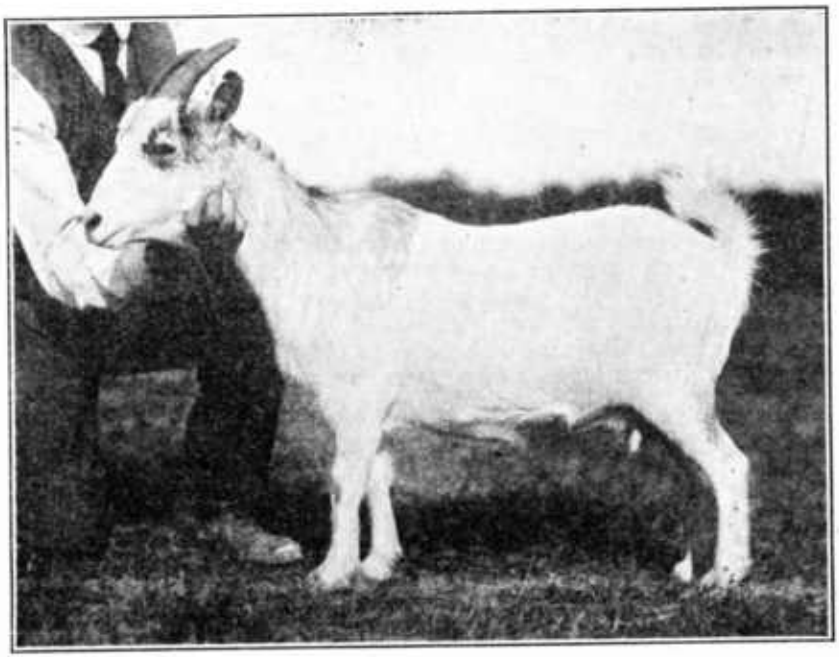

Fig. 11.—Common American doe No. 66. Dam of doe No. 114, shown in Figure 7. Produced 367 pounds of milk, testing 7.6 per cent fat, in a lactation period of 275 days

COMMON, OR AMERICAN

Either of the names "common" or "American" may be applied to a large number of short-haired goats found in many sections of the United States, especially in the South. In many sections these goats have been bred for a great many years without the introduction of outside blood, so that in general conformation they are very nearly uniform.

They are of medium size and somewhat short legged, rather meaty in appearance, and do not show the conformation of the Swiss breeds. Although a few goats of this type are occasionally found that are good milkers, the quantity of milk produced is usually small and the lactation period is for only a few months. One of the greatest objections from the standpoint of utilizing this type of goat for milking

is the fact that the teats are usually short and small. Both sexes as a rule have horns, those on the bucks frequently attaining a good size. This type of goats is of various colors; brown of various shades, brown and white, black and white, bluish gray, and white predominate.

The Bureau of Animal Industry selected a shipment of common short-haired goats in the South in 1909 for the purpose of testing them for their milk production. It was found that the does not only produced a rather small quantity of milk, but the average lactation period was short. In 1915, 10 of the best selected does produced milk for periods of from 7 to 10 months and gave from 1 to 2 pounds of milk a day. The average production for the 10 does was 1½ pounds. The per cent of butterfat ranged from 6.5 to 9.4, the average being 7.6 per cent.

These goats are very prolific. In 1912 the rate of increase was a little over 250 per cent, and for a period of several years it was 225 per cent.

Owing to the scarcity of good milk goats, the common or American type properly selected offers a good foundation for grading up with the Toggenburg, Saanen, or Nubian breed.

Since it would require many years to build up a good milking type by the use of the common goats alone, and such excellent results were obtained by crossing Saanen and Toggenburg bucks on them, the bureau discontinued the use of common goats in 1913.

Large numbers of goats have been brought in from Mexico, and they have no doubt had some influence on the type found in many parts of the South and Southwest.

METHODS OF BREEDING

SELECTION OF THE BUCK

A buck is always considered half the herd, and, in order to make progress in breeding, care should be exercised in making a selection. As good bucks are scarce, it is not always possible to get the type desired, but the best obtainable should be procured even if the cost is a little greater. Select a buck from a good-producing doe and a persistent milker. There is nothing so important in the matter of breeding as evidence that the entire family to which the sire belongs is especially good in conformation as well as in performance. The success of breeding any class of animals depends largely on the selection of the sires. The selection of a single sire has made many herds famous.

A buck should be masculine in appearance, of at least medium size for his age, and of good conformation. As regards the latter, a good depth of body is one of the most important considerations. The masculinity of the buck can be determined, of course, by the size and conformation of the head, size of the legs, amount of beard, and the quality and length of the hair on various portions of the body. The legs should be straight and well placed. Always select a vigorous buck. Thinness is no objection if the buck is healthy and a good feeder. A good buck is seldom in good flesh, especially during the breeding season.

Most breeders at the present time prefer bucks that are naturally hornless. Such bucks are usually prepotent and most of their kids are without horns. The class of does to which the buck is bred will of course have some influence in this respect.

When only a few does are kept, it would be not only cheaper but more convenient to send them away to be bred. A buck is usually a troublesome individual and must be kept away from the rest of the herd. Many of the leading breeders breed outside does and the charges made are usually very reasonable.

Many small breeders are compelled to use crossbred or grade bucks; in such cases selections should be made upon conformation and breeding.

SELECTION OF THE DOE

Although it is not always possible, it is much more satisfactory in making selections to see does during their lactation period. This not only gives an opportunity to study their conformation when they are producing, but the udder development, which is so important, can be better considered.

A good doe should have a feminine head, thin neck, sharp withers, well-defined spine and hips, thin thighs, and rather fine bone. The skin should be fine and thin when examined over the ribs. She should have good digestive capacity, as shown by the spring of rib and size of stomach. The so-called wedge shape of the dairy cow is clearly defined in a good milk doe. The constitution, an important item, is defined by the depth and width of the chest. The udder should be of good size when filled with milk and very much reduced when empty. A large udder does not always indicate a high milk yield unless it is of the so-called "genuine" type. The teats should be large enough to make milking easy.

In selecting a doe the first questions that are naturally asked are, How much milk will she produce and how long will she milk? While some does milk for only a few months after kidding, others continue producing for 8 to 10 months or even longer.

In selecting does, especially when they are giving milk, avoid those that are fleshy; this is a strong indication that they are not good producers. Select those of the dairy conformation.

Owing to the scarcity of good does, both grades and purebreds, and the prices asked for them, it is much more economical to begin by selecting good, common does, such as are found in many sections of the country, and breeding them to bucks of the leading breeds, such as those mentioned before.

AGE FOR BREEDING

Goats are in their prime when from 4 to 6 years of age, but choice individuals and good breeders may often be kept to advantage several years longer. As a general rule young does should not be bred until they are from 15 to 18 months of age, at which time they will be practically grown if they have been well cared for. As most breeders have their does kid in the months of February, March, and April, and breed them but once a year, it means that the doe kids dropped during these months should be bred the second fall after

birth. Owing to the fact, however, that some people who keep only two or three does desire a milk supply during the entire year, it would be necessary to breed for both fall and spring kidding. The same would be true where goat dairies are operated. In such cases young does, well grown, can be bred to advantage when from 12 to 15 months of age.

Does breed when young, and care should be taken not to allow them to become pregnant too young. Cases are recorded in which does have kidded when less than 9 months of age.

PERIODS OF HEAT

Does come in heat regularly between September and March, after which only an occasional doe can be bred until late in August, when the entire herd will come in heat again. When they come in heat and desire the attention of the buck they make their condition known by uneasiness and constant shaking of the tail. They usually remain in heat from 1 to 2 days. The period between heats varies from 5 to 21 days. From the record kept of the bureau's herd, more does have returned in from 17 to 21 days, but it is not unusual for them to return in from 5 to 7 days after service. Bucks are continually of use for service from the fall to the spring season. It is during this time that they have such a strong odor. The number of does to breed to one buck depends on his age and condition. An early spring buck kid, if well grown and properly handled, can be bred to a few does the following fall. A buck from 12 to 18 months of age can be bred to at least 25 does, and a mature buck is sufficient for from 40 to 50 does.

GESTATION PERIOD

The gestation period, which is the time between the effective service of the buck and the birth of the kid or kids, ranges from 146 to 152 days. It is usually spoken of as 5 months. The average gestation period for several years in the bureau's herd with does of several types has been 149 days.

NUMBER OF KIDS

Milk goats are very prolific. As a rule, very few single kids are produced. The usual number at one time is two, but frequently there are three, and it is not a rare thing, especially among the common American goats, to have a doe produce four. The annual rate of increase in the bureau's herd for the past six years with does of several types has been 183 kids per 100 does.

FEED AND MANAGEMENT

THE BUCK

In handling goats the buck problem is one of considerable importance. It is the strong odor and the disgusting habits of the bucks that cause many people to take a great dislike to goats. Bucks should be kept away from the does except when desired for service. If they are kept in the same barn or room where the does are milked,

some of the strong odor is very liable to be absorbed by the milk. The place for the bucks is in a separate barn or shed, with a sufficient lot for exercise and pasture.

The best results can be expected only when the bucks are kept in a healthy condition. During the winter months the ration should consist of alfalfa, clover, or mixed hay and corn stover, with some succulent feed in the way of silage, turnips, etc., and a sufficient quantity of grain.

For several seasons the bucks in the bureau's herd have been wintered on 3 pounds of alfalfa or clover hay, 1 to 1½ pounds of silage or turnips, and 1½ pounds of grain a day, the grain mixture consisting of 100 pounds of corn, 100 pounds of oats, 50 pounds of bran, and 25 pounds of linseed meal. During the breeding season the grain ration for mature bucks is usually increased to 2 pounds. When the bucks are out on good pasture, no grain is necessary.

During the breeding season it is usually necessary to keep the bucks separate or they will fight and are likely to injure one another. A wood lot with plenty of browse is an excellent place for the bucks during the summer. It must be noted that goats are browsers by nature and they prefer leaves and twigs and weeds to grass.

Under the conditions which many people keep goats it is necessary to protect the trees in the lots and pastures by putting around them a framework covered with close-woven wire. This is especially true of the young trees. If no lot is available for feed and exercise, the buck may be tethered out. This system is practiced by many people who have only a small lot. Vacant lots can very often be utilized to advantage for this purpose. Fresh feed as well as a variety is thus afforded.

THE DOES

Most of the feeds that are valuable for the production of milk for the dairy cow are also suitable for does. It is ordinarily considered that from six to eight goats can be kept upon the feed required for one cow. When does are in milk, they should be allowed all the roughage that they will consume, such as alfalfa, clover, or mixed hay and corn stover. They should receive a liberal quantity of succulent feed, such as silage, mangel-wurzels, carrots, rutabagas, parsnips, or turnips. The grain feeds best suited for their ration are corn, oats, bran, barley, and linseed meal or linseed cake. Other feeds that are often available and that can be utilized are cotton-seed meal, brewers' grains, corn bran, gluten feed, and beet pulp.

A ration that has been used in the bureau's herd and has proved to be very satisfactory for does in milk during the winter season consists of 2 pounds of alfalfa or clover hay, 1½ pounds of silage or roots, and from 1 to 2 pounds of grain. The grain ration consists of a mixture of 100 pounds corn, 100 pounds oats, 50 pounds bran, and 25 pounds of linseed meal. When the does are on pasture they receive from 1 to 1½ pounds of grain per day of the mixture mentioned.

However, there is a great difference in individual goats; one goat may readily eat a ration that another may not like so well. As in the case of dairy cows, each doe should be studied if the best results are to be obtained. It is best, of course, to feed separately each doe

giving milk. This not only gives an opportunity to study each individual but also insures that each one receives the quantity intended for her.

In 1916, in the bureau's herd, with 10 half-blood Toggenburg and half and three-quarter blood Saanen does, during their lactation period it required 1.21 pounds of grain to produce a quart of milk.

During the fall and early winter the pregnant does should be allowed all the roughage they will consume, together with 1 pound of silage or roots and 1 to 1½ pounds of grain of the same mixture as mentioned for does in milk. Care should always be taken to see that the silage is of good quality; it should not be fed if frozen or moldy. Silage and turnips should always be fed after milking, and if any uneaten silage remains in the trough it should be removed. Pregnant does require plenty of exercise to produce strong, healthy kids.

It is safe to figure on 300 pounds of hay and 450 pounds of grain a year for a mature doe, that is, of course, assuming that good pasture is afforded as much of the year as possible. The New York Experiment Station at Geneva reports in Bulletin 429 that the average cost of feed per goat for the year 1912 was $11.05. The California station reported in Bulletin 285 that the average cost per year for each of five purebred and grade does kept at the station in 1914 was $11.24. This agrees very closely with the cost at the Geneva station. The average cost of the feed needed to produce 1 gallon of milk in this experiment was 6.4 cents.

Young does should be kept growing, and the quantity of feed needed will depend upon certain conditions. In the spring, summer, and fall, if they have plenty of browse and pasture, no grain is necessary. If no browse is afforded and the pasture is short during certain months it is best to give them a little grain. In winter they should be fed about 1 pound of grain, 1 to 1½ pounds of silage or roots, and all the hay or fodder they will consume. They should have a shed for shelter and protection from the wind. Goats must be kept dry and out of the cold winds.

Some goat breeders make it a practice to gather leaves in the fall and store them for winter use. This is a very good practice, as the leaves are not only readily eaten by the goats but can be used for bedding. If only one or two goats are kept, refuse from the kitchen, such as potato and turnip peelings, cabbage leaves, and waste bread may be utilized for feeding. If necessary, does can be tethered out as mentioned for the buck.

All feed offered to goats should be clean. Rations should be made up from the best feeds available and those most relished by the goats. Plenty of rock salt should be kept before the goats, and a small quantity of fine salt should occasionally be mixed with the grain fed. A good supply of fresh water is necessary; goats should not be compelled to drink from pools where the water has been standing.

LACTATION PERIOD

The lactation period, which is the time that a doe produces milk, varies considerably in the different breeds and types of goats. It ranges all the way from 3 to 10 months, or even longer. A lactation period ranging from 7 to 10 months is considered very satisfactory.

There are certain conditions, such as the breed, individuality, health, feed, and regularity and thoroughness of milking, which may influence it. Purebred does of any of the leading breeds, as a general rule, will milk longer than any of the so-called common, or American type. The breed that has been developed the longest should, of course, excel in this respect if the animals have been properly selected. There are always individuals in a breed that excel along certain lines, and this is especially true as regards the lactation period.

The health of the does while giving milk is of special importance. Does when out of condition frequently shrink in their milk yield and

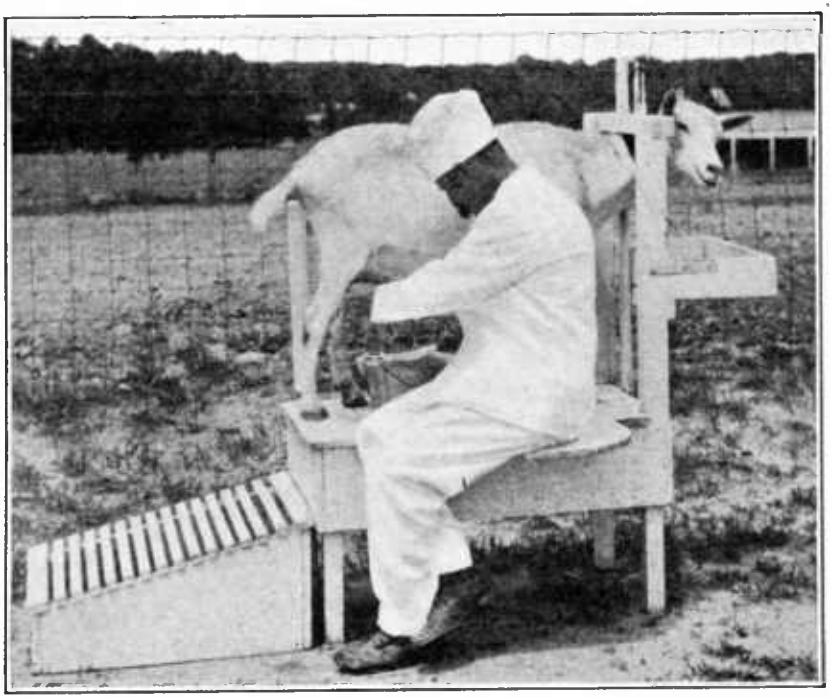

FIG. 12.—Milking stand and method of milking in the herd of the Bureau of Animal Industry, Beltsville, Md.

in many cases have to be dried up. Proper feed and regular feeding have a tendency to extend the lactation period by not only stimulating the production but causing a more uniform flow during this time. The milking must be done regularly and thoroughly if good results are desired. Irregularity and neglecting to draw all the milk from the udder has a tendency to shorten the period.

MILKING

As goats are small animals, they can be milked to much better advantage when on a stand such as shown in Figure 12. As young does usually object at first to being milked, the stanchion arrangement shown in the illustration is an excellent method of handling

them. For the first few times at least it is best to give the does a little grain feed in the box attached to the stanchion. Does soon become accustomed to being milked and after a few times will jump upon the stand and put their heads through the stanchion without being assisted.

The doe's udder should always be either washed or wiped thoroughly before being milked. Ordinarily a damp cloth is sufficient to remove all foreign material. The first milk drawn should not be saved, as the openings in the teats may be partially filled with foreign matter which will be removed after a little milk has been drawn. It is best to have a room for milking separate from the main goat barn. This prevents the milk from absorbing any goat odors that may be present.

There are two systems of milking goats, one when the milking is performed from the side, as is practiced in milking cows, and the other from the rear of the goat. It is claimed that the second system

FIG. 13.—A Pennsylvania goat dairy, showing method of milking

is used because the goat can not be trained to set her right hind foot back, as a cow is trained to do. All the does in the bureau's herd, however, have been trained to keep the right hind foot back while being milked.

There are also two systems of drawing the milk from the udder—one consists in pressing the teat in the hand, as is usually practiced in milking cows, and the other in "stripping." The first can be adopted when the teats are of sufficient size to be grasped by the hand. The other method is followed by most goat milkers and is a very satisfactory way. The teat is grasped between the first finger and the thumb close to the udder and drawn down the entire length, sufficient pressure being exerted to cause the milk to flow freely.

A heavy producer may have to be milked three times a day for a short time, but twice is sufficient for most does. The period between milkings should be divided up as nearly equally as possible. Milk should not be used for human consumption until the fourth or fifth

day after the doe kids. Some authorities recommend waiting for a longer period, but this is not necessary if everything is normal. Regularity in milking is important, and kindness and gentleness should be regarded as essential in the goat dairy. It is advisable that the milking be done by the same person as much as possible.

It may be stated as a matter of interest that in some of the European countries goats are driven through the streets from door to door and the milk is drawn by the goatherd as ordered by the customers.

CARE OF THE MILK

All utensils used in handling the milk should be kept clean. As soon as the milk is drawn it should be weighed, strained, and cooled. The weighing is necessary if it is desired to determine accurately how much the doe produces. Milk records are especially valuable to the breeder in selling stock as well as in his breeding operations.

FIG. 14.—Milking pail used in the bureau's dairy. Capacity, 4 quarts

The milk should always be thoroughly strained to remove any foreign matter. The best method is to use a layer of sterilized absorbent cotton between two cloths, or to pass the milk through several thicknesses of cloth. Cheesecloth is the best for this purpose.

To check the growth of bacteria the milk should be cooled to a temperature of 50° F. as soon after milking as possible. This may be done by placing the cans in a tank containing cold water. One of the best systems of cooling the milk rapidly, however, is to run it over a cooler inside of which is cold, running water. Milk should be kept cool until wanted for use. Complete information on the production of clean milk is contained in Farmers' Bulletin 602.

RAISING THE KIDS

The raising of the kids is especially an important consideration when it is desired either to sell or use the milk for family purposes.

Those, however, who do not care to raise the kids can easily dispose of them when a few days old. Kids that are allowed to suck their dams not only make a good growth but require very little attention as compared with those raised by hand.

The quantity of milk to be fed and the length of time that it should be fed depends on several conditions. Kids dropped in the spring do not require so much milk and need not be fed so long as those dropped in the fall or early in winter. The quantity of milk required for a kid can be determined readily from the fact that a doe producing from 3 to 4 pounds of milk a day can easily raise two kids very satisfactorily. This means that each kid would receive 1½ to 2 pounds of milk a day, or, in other words, 1½ to 2 pints. The bureau has made an experiment in allowing several does with records of a little above 4 pounds of milk a day to suckle three kids. The kids made a fairly good growth, which shows that when some hay and grain is added it does not require so much milk as may be supposed.

FIG. 15.—Half-blood and three-quarter-blood Saanen kids

Kids to be raised by hand should be allowed to remain with the doe for two days. This gives them an opportunity to obtain the colostrum milk which is so valuable for them.

Kids can be raised satisfactorily on cows' milk, skimmed, and some goat breeders adopt that system. They should be changed from whole to skim milk very gradually, the quantity of skim milk being gradually increased until it makes up the entire milk ration. After this has been done the kids will usually consume from 2 to 3 pounds a day. They should be given just as much as they will readily drink, and until they are at least 6 weeks old they should be fed three times a day. During this time the milk should be warmed and fed at a temperature of 90° F. They can be weaned from milk when they are from 3 to 4 months old. At that age they consume sufficient hay, grain, or pasture feed to make a good growth. Some of the leading goat breeders do not wean the kids until they are about 5 months of age. The age for weaning, however, depends on the system of raising the kids. If raised by nursing the does,

they can be allowed to go for the five months, but if raised on skim milk and the supply is limited, they can be weaned much earlier.

Kids eat a little hay and grain at an early age, and they should be provided with them. Alfalfa or clover hay should be given in a rack and the grain mixture in a trough. Arrangements should be made to keep the kids out of both the rack and the trough. A good grain ration for the kids consists of cracked corn, crushed or rolled oats, and bran mixed in the proportion of one part cracked corn, one part crushed or rolled oats, and one-half part bran. They should be allowed as much as they will clean up in a reasonable time.

FIG. 16.—Feeding kid with milk from pan; method followed in the bureau's herd

If the kids are fed by hand, they can either be given the milk from a bottle, using a nipple, or a tank with a number of nipples attached, or they may be fed from pans. The bureau has used both the "pan and trough" and "bottle and nipple" methods in raising kids. Most kids can easily be taught to drink from a pan or trough, thus making this system less troublesome. Some kids, however, are very slow in learning to drink, and do much better when fed from a bottle. Cleanliness is absolutely essential for the successful raising of kids. See that the pans, pails, bottles, and nipples are kept clean. After the kids are a few weeks old they can drink from a galvanized-iron trough. Care should be taken, however, to see that each kid receives its share of the milk.

Kids are very playful creatures and require considerable exercise. If they are kept in a small inclosure, it is a good plan to put a box from 18 to 20 inches in height in the center, so that they may run and jump upon it. This will not only afford them considerable amusement but will give them plenty of exercise, and they will have keen appetites for their feed. Pasture or browse should be afforded as early as possible.

CASTRATION

All buck kids not desired to be kept or sold for breeding purposes should be castrated when they are from 10 days to 3 weeks of age. The older they become the more severe the operation. The operation of castration is very simple and can be performed best by cutting off the lower third of the scrotum with a clean, sharp knife, forcing the testicles down and pulling them away, one at a time, with the spermatic cords attached. If, however, the kids are more than 4 months of age, the cords should not be pulled out but scraped off just above the testicles. The wound should be bathed with some good disinfectant after the operation.

Buck kids should be separated from the doe kids when they are about 4 months of age. Doe kids come in heat when young, and

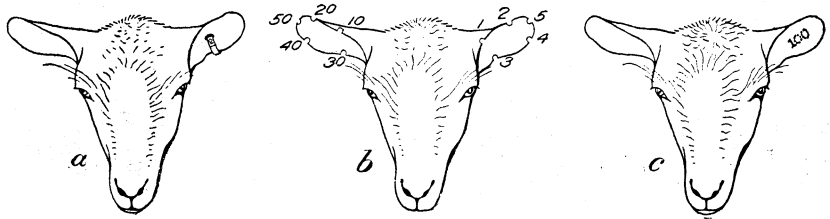

FIG. 17.—Methods of marking goats' ears. *a*, Metal label; *b*, notching; *c*, tattooing

the young bucks worry them a great deal if allowed to run with them. Occasionally doe kids become pregnant when they are only from 4 to 5 months of age.

MARKING

Each goat in the herd should be marked in some manner for identification. This may be done by the use of metal ear labels, by notching the ears, or by tattooing the ears. In some instances all three of these systems are used. When this is done, the kids' ears are notched as soon after birth as possible, and when they are from 3 to 6 months of age the ear label is inserted and the tattooing done. The ear label is not only numbered but has either the initials or name of the breeder on it. The only objection to its use is that it is liable to be torn out. Care should always be taken to insert the label rather close to the head and far enough up into the ear to make it fairly tight.

Notching the ears can be done with the punch used for inserting the ear label. Notches on certain parts of the ears indicate certain numbers, the sum of the numbers represented by the notches being the number of the goat. Numbers up into the hundreds involve a rather complicated system, but they are not usually necessary in a small herd. To avoid a complex system, each crop of kids may be

numbered from one upward. The notch system is especially valuable, as it not only serves as a means of identification but it is not always necessary to catch the goats to read their numbers. A person can stand some distance from the goat, and if the goat is facing him the notches can readily be seen.

Tattooing on the inside of the ear is the most statisfactory method of marking goats. Tattooing instruments are on the market, having adjustable numbers and letters, with which a combination containing three or four of either or both can be made. Some breeders tattoo their initials in one ear and a number in the other. Tattooing is an excellent method of checking on the ear label, as the same number as is on the label is usually tattooed. India ink, both stick

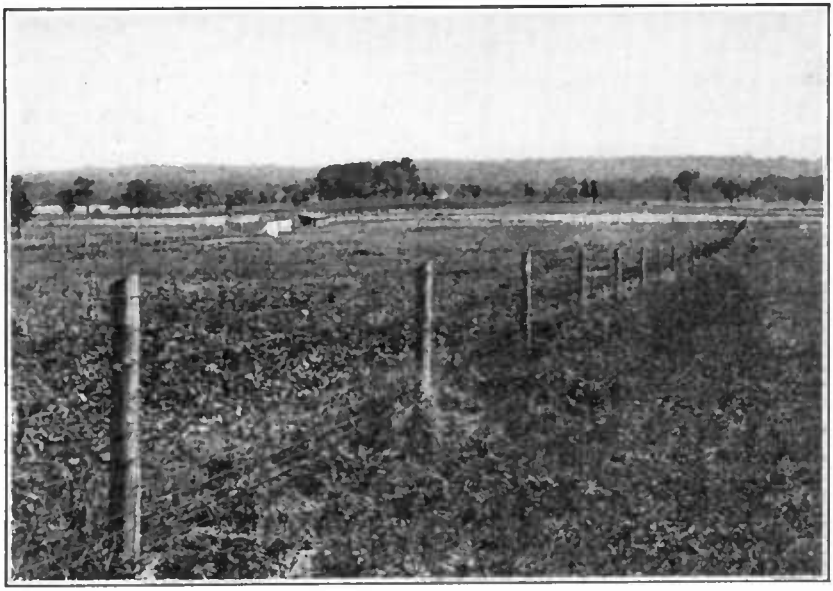

FIG. 18.—Type of goat fence used at the Bureau of Animal Industry's Experiment Farm, Beltsville, Md.; 42 inches high. (This fence appears also in the background of Figure 12)

and liquid, special tattooing oil, and indigo can be used for pigment.

DIPPING, DEHORNING, ETC.

When goats are infested with lice, as they sometimes are, they should be either dipped or washed. If the herd contains only a few head, it is not necessary to go to the expense of dipping, as a careful washing will gain the desired results. Any good, reliable stock dip as advertised upon the market will answer the purpose. The main thing is to follow the instructions regarding the use of the dip selected. Methods of dipping sheep, as described in Farmers' Bulletin 798, "The Sheep Tick," may be followed in the case of goats.

Mature goats may be safely dehorned. This is done best by sawing the horns off close to the head with a common meat saw. The operation should be performed if possible when the weather is fairly

cool and when flies are not troublesome. As soon as the horns are removed it is well to apply a little pine tar to the wounds.

The horns on kids can be prevented from developing by using either caustic soda or caustic potash, which may be obtained from the drug store in the form of sticks about the thickness of a lead pencil. These caustics should be used with care, as they may injure the skin of the person handling them. The stick caustic should be wrapped in a piece of paper to protect the fingers, leaving one end uncovered. Moisten the uncovered end and rub it on the horn buttons. Care should be taken to apply the caustic to the horn button only, but it should be blistered well. This is best effected by clipping the hair close to the head for some distance around the horn button and coating the surface with vaseline, leaving the skin close to the horn button and the button itself free from the coating.

The caustic may then be applied to the uncoated portion without danger of its burning the remainder of the head or running into the eyes. The application should be made when the kids are from 2 to 5 days old.

The best fence for inclosing goats is of woven wire, ranging in height from 42 to 48 inches. Care should be taken, however, to have the ends of the braces against the end posts low enough so that the goats can not walk up them and jump over.

If goats are more or less confined and not allowed to run upon gravelly or rocky soil their hoofs grow out and should be trimmed. This can be done with either a sharp knife or a pair of small pruning shears.

GOAT MEAT AND GOATSKINS

There has always been a rather general prejudice in this country against the use of goat meat as food. However, in some sections a great many goats of the milk type, especially kids, are annually consumed. In some parts of the South kids are considered as a delicacy and are in demand. They are sold for slaughter when from 8 to 12 weeks of age. The flesh of young goats, or kids, is palatable and has a flavor suggesting lamb. If properly cooked, the meat from a mature milk goat is also good eating, provided the animal has been properly fed and is in good condition.

The prices of goats sold on the market for slaughter are always considerably less than those received for sheep. Goats do not fatten and carry flesh like sheep. Nevertheless it is known that thousands of goats, both old and young, are annually slaughtered and their meat sold as mutton and lamb.

Owing to the fact that the United States imports in normal times upward of 40,000,000 goatskins annually, it would naturally be supposed that there should be a ready market for all skins that could be produced. Skins from the short-haired goats, such as the common type of American goats of the milk breeds, are the kind used in the manufacture of shoes, gloves, book bindings, pocketbooks, and like articles. As a rule goatskins from the short-haired goat are worth from 25 to 50 cents each. However, in large lots and properly prepared for sale they bring a higher price. The price depends on the size and condition of the skin.

PRICES OF GOATS

Owing to the excellent demand and the limited supply of milk goats, breeders are naturally asking good prices for stock. Purebred bucks of any of the leading breeds cost $100 or more, depending, of course, on the breed, age, conformation, and breeding. Good bucks from record-producing does are usually held at a higher figure. Grade or crossbred bucks may usually be purchased for from $15 to $35. Bucks of such a breed as the Nubian are very scarce and the prices asked for them are usually high.

The prices for does not only depend on the breed, age, comformation, and breeding, but on milk production. Purebred does cost from $100 to $150 or more, whereas grade or crossbred does range from $25 to $75. Persons who wish to procure a milking doe to furnish milk for an infant or an invalid are only too glad, as a rule, to pay a fair price and do not care so much about the breeding of the goat. It is largely milk production in the doe that establishes her value.

In some herds, where breeders do not care to raise all the kids and desire to dispose of them as soon as possible after birth, the prices range from a few dollars up to $10 a head.

RENTING GOATS

It occasionally happens that a supply of goats' milk is desired for only a short time. Under such conditions does are sometimes rented. Sometimes a breeder would not care to sell a doe but would be willing to rent her out. The charges for this service not only depend on the value of the doe and the quantity of milk she is capable of producing, but on how badly the goat is needed. The writer recalls one case in which a doe was rented for a period of three months at $10 a month, and in case of the death of the doe the owner was to receive her full estimated value. However, a fair basis for the charge of renting out a doe would be a reasonable price per quart for the milk she would probably produce during the period wanted.

GOAT TROUBLES

Although considered very healthy, goats are subject to disease and have their troubles as well as any other class of animals. Goats are less subject to disease than sheep, but the two species are so closely allied that the treatment in cases of disease is the same for both.

A matter of great importance and one on which breeders lay considerable emphasis is the fact that goats are rarely affected with tuberculosis. Their freedom from this widespread and dreaded disease is probably due to environment rather than to natural immunity. When confined to close quarters with cows that have tuberculosis, they will, however, contract the disease. Goats that are in good condition are not very liable to be diseased or to contract disease, but there are some maladies which affect them if they are allowed to get in poor condition.

In the Federal meat inspection the cause of most of the condemnations for goats on both ante-mortem and post-mortem inspections is emaciation. Emaciation may be due to any one of or a combination of

several conditions or diseases, such as stomach worms, flukes, tapeworms, and abortion. It is necessary, of course, to find out the real cause of this condition before a treatment can be administered.

STOMACH WORMS

Goats become infected with stomach worms, the important symptoms of which are loss of flesh, weakness, digestive disturbances, diarrhea or constipation, capricious appetite, and paleness of the mucous membrances of the eyes and mouth. Swellings under the jaw are often noticed. Stomach worms are found in the fourth stomach; they are rather small, ranging from ½ to 1¼ inches long and about as thick as an ordinary pin.

There are two methods of treatment, one with the use of gasoline and the other with copper sulphate (bluestone or blue vitriol). Tests made by the Zoological Division of the Bureau of Animal Industry indicate that in sheep the gasoline treatment is not only less efficacious and more troublesome than the bluestone or copper sulphate, but is liable to have a more injurious effect on the animal. The evening before the animals are to be treated they should be kept off feed and water and the medicine administered the next morning.

To prepare the copper-sulphate solution dissolve 1 ounce of copper sulphate in 3 quarts of water. Avoid copper sulphate which shows white patches. The solution is administered as a drench. A kid 3 months old should be given three-fourth of an ounce, at 6 months 1½ ounces, at 12 months 2½ ounces, at 18 months 3 ounces, and at 24 months 3½ ounces.

Common salt acts to a certain extent as a preventive against infestation of internal parasites, and the importance of this should be kept in mind in handling goats.

The use of wide range and dry, hillside pastures is an aid in preventing stomach-worm infestation, but the use of small ranges facilitates infection. Inclosures free from vegetation are probably not so dangerous as those containing vegetation. Cleaning out the manure frequently and thoroughly is an aid in keeping the inclosures safe. Pasture rotation is also an aid in control and should be practiced whenever possible. Wherever it is impossible to use these aids to control and goats must be kept constantly on small pastures, the routine use of the 1 per cent solution of copper sulphate every three weeks is a valuable control measure.

Stomach-worm infestations are sometimes complicated by the presence of other parasitic worms, such as hookworms, and the addition of 1 per cent by weight of snuff or finely powdered tobacco dust to the 1 per cent copper-sulphate solution makes a more effective solution for the control of these mixed infestations. A more extended discussion of this subject is given in Farmers' Bulletin 1330, "Parasites and Parasitic Diseases of Sheep," a bulletin of value to goat raisers, since sheep and goats have many parasites in common.

MALTA FEVER

The disease known as Malta fever has been endemic on the island of Malta for many years, and its presence in other parts of the world has been recognized from time to time. In the United States it has been found in Texas, Utah, Arizona, and New Mexico. Its origin

in these States is indefinite, but it is stated that it prevailed in Texas when the common goat was the only type in the country. The disease can be transmitted to man. In localities where the disease is prevalent it is important to pasteurize or scald the milk before using it.

ABORTION

Abortion occurs occasionally in the herd. It may be caused by an injury or it may be of a contagious nature.

If a doe aborts she should be placed in a pen by herself, away from the herd, and be kept isolated until discharges from the generative organs cease and recovery is complete.

The fetus and afterbirth, provided the latter has been expelled, should be disposed of in such a manner as to be inaccessible to the rest of the herd. Similar disposition should be made of the discharges from the genital organs and of contaminated bedding.

Pens in which abortive does have been isolated should be well cleaned and disinfected before being used again.

Treatment of the aborting does consists in the application of measures directed toward restoring the generative organs to their normal condition. When the afterbirth is promptly expelled it may be wise to confine efforts to those pertaining to the comfort and nourishment of the animal. When the afterbirth is retained, however, or there is evidence of severe inflammation of the womb, it is advisable to introduce into the womb, through a soft-rubber tube, 2 or 3 ounces of mineral oil to which is added a half dram of iodoform. This treatment appears to render the attachment of the afterbirth to the womb less firm and to prevent excessive bacterial infection of the organ. In the absence of treatment, severe cases may terminate in blood poisoning and death.

MINOR AILMENTS

CONSTIPATION

Constipation sometimes occurs, especially in kids. A dose of Epsom salt or castor oil will correct the trouble.

LICE

Goats frequently become infected with lice. This matter is treated on page 27, under dipping.

CAKED UDDER, OR GARGET

Caked udder, or garget, is something that should be looked after very carefully. When this condition is present the udder feels hard and is hot. The best treatment is to bathe the udder thoroughly with warm water several times a day and after thorough drying with a cloth rub on a little lard. It is well also to give a dose of Epsom salt.

SORE TEATS

This condition may be caused by either the teeth of the kids, warty growths on the teats, or an injury. After washing and drying the teats carbolated vaseline should be applied.

FOOT ROT

Unless properly managed, goats may have foot rot. The first evidence of this trouble to attract attention is a slight lameness, which rapidly becomes more marked. The foot will become swollen and warm to the touch. The best method of treatment is by the use of a mixture of red lead and pulverized copper sulphate, equal parts by weight, made into a paste by adding full-strength nitric acid. Coal tar should be applied to the feet after the disease has been conquered, to effect a rapid healing of the sore.

MILK-GOAT REGISTRY ASSOCIATIONS

The American Milch Goat Record Association was organized in 1903. The object of the association was to establish and improve the breeds of milk goats in America; to collect information of the history and pedigree of the best milk goats wherever found and to preserve the record of the same; to publish as much of such information as shall be deemed advisable by the board of directors; to exhibit milk goats at such times and places and under such regulations as may be decided upon by the directors. The first 23 volumes of this association record 22,000 head. W. L. TeWalt, Vincennes, Ind., is the present secretary.

The International Nubian Breeders Association was organized in 1916. The object of this association is to promote the interests of the Nubian breed. Archie C. Talboy, La Jolla, Calif.. is the present secretary.

ORGANIZATION OF THE UNITED STATES DEPARTMENT OF AGRICULTURE

June 1, 1926

Secretary of Agriculture	W. M. JARDINE.
Assistant Secretary	R. W. DUNLAP.
Director of Scientific Work	———
Director of Regulatory Work	WALTER G. CAMPBELL.
Director of Extension Work	C. W. WARBURTON.
Director of Information	NELSON ANTRIM CRAWFORD.
Director of Personnel and Business Administration	W. W. STOCKBERGER.
Solicitor	R. W. WILLIAMS.
Weather Bureau	CHARLES F. MARVIN, *Chief.*
Bureau of Agricultural Economics	THOMAS P. COOPER, *Chief.*
Bureau of Animal Industry	JOHN R. MOHLER, *Chief.*
Bureau of Plant Industry	WILLIAM A. TAYLOR, *Chief.*
Forest Service	W. B. GREELEY, *Chief.*
Bureau of Chemistry	C. A. BROWNE, *Chief.*
Bureau of Soils	MILTON WHITNEY, *Chief.*
Bureau of Entomology	L. O. HOWARD, *Chief.*
Bureau of Biological Survey	E. W. NELSON, *Chief.*
Bureau of Public Roads	THOMAS H. MACDONALD, *Chief.*
Bureau of Home Economics	LOUISE STANLEY, *Chief.*
Bureau of Dairying	C. W. LARSON, *Chief.*
Fixed Nitrogen Research Laboratory	F. G. COTTRELL, *Director.*
Office of Experiment Stations	E. W. ALLEN, *Chief.*
Office of Cooperative Extension Work	C. B. SMITH, *Chief.*
Library	CLARIBEL R. BARNETT, *Librarian.*
Federal Horticultural Board	C. L. MARLATT, *Chairman.*
Insecticide and Fungicide Board	J. K. HAYWOOD, *Chairman.*
Packers and Stockyards Administration	JOHN T. CAINE, *in Charge.*
Grain Futures Administration	J. W. T. DUVEL, *in Charge.*

This bulletin is a contribution from

Bureau of Animal Industry	JOHN R. MOHLER, *Chief.*
Animal Husbandry Division	E. W. SHEETS, *Chief.*

33

ADDITIONAL COPIES
OF THIS PUBLICATION MAY BE PROCURED FROM
THE SUPERINTENDENT OF DOCUMENTS
GOVERNMENT PRINTING OFFICE
WASHINGTON, D. C.
AT
5 CENTS PER COPY